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Drosophila fauna of Sahyadri Hills (Western Ghats) with description of a new species

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Abstract. *Drosophila* collections of Sahyadri Hill range revealed the occurrence of several known species of *Drosophila* in addition to a new species, *Drosophila sahyadrii*, a member of the *suzukii* subgroup of the *melanogaster* species group of the subgenus *Sophophora*. The distributional pattern of different species is closely related to the nature of the environmental conditions of the localities. The morphology and internal characters of the new species are described. The systematic position and the affinities are discussed.

Keywords. *Drosophila* fauna; Sahyadri Hills; *Drosophila sahyadrii*; diptera; taxonomy.

1. Introduction

The available data on the systematics and distribution of *Drosophila* fauna of the Indian sub-continent is incomplete. Therefore, intensive efforts have to be made to get an idea of the varied species of *Drosophila* and their pattern of distribution. Sahyadri Hill range, a part of Western Ghats lying towards the western side of Shimoga district, with its tropical forests and mountain wilds provides a congenial abode for the rich colonization of *Drosophila* species. It has an average annual rainfall of about 2978·9 mm, maximum temperature of 35° C and maximum humidity of 81%. As a part of our study of *Drosophila* fauna of Western Ghats, a collection trip to Sahyadri Hill range was undertaken. The details of the collection record along with the description of the new species, *Drosophila sahyadrii*, are herein presented.

2. Materials and methods

Drosophila collection was undertaken during the monsoon season in September 1977, in five localities covering a distance of 80 km all along the river Tunga at

variable altitudes of 590 to 710 m. The flies were collected by the usual banana trap method. The collected flies were etherised, categorised and identified. The individuals that could not be identified were isolated into separate vials containing food medium. The progeny obtained from such single gravid female was used for detail morphological and anatomical studies to assign them to respective groups. Counts were made of each species with regard to number and sex. The flies obtained from the flowers of *Ipomoea* species were identified as a new species. Camera lucida drawings of periphallic and phallic organs of this new species were made. The photographs of male wing and fore leg were taken.

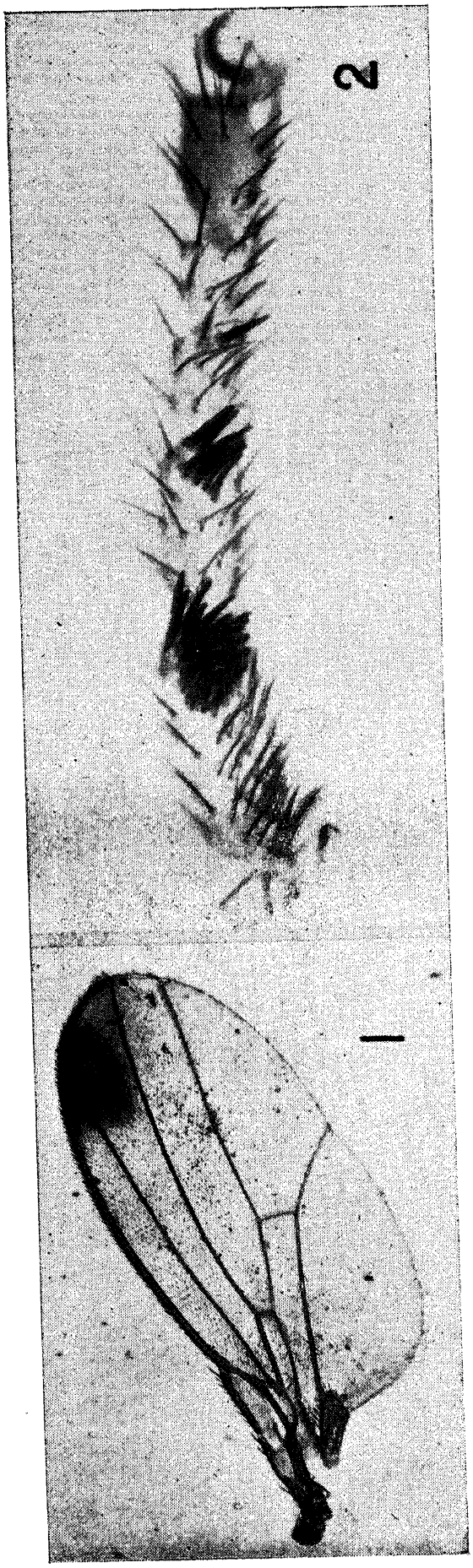
3. Observations

A total of 1531 flies were trapped consisting of 10 species representing two subgenera viz., *Sophophora* and *Drosophila* (table 1). Of the 10 species collected, three species viz., *D. malerkotliana* Parshad and Paika, *D. nasuta* Lamb, and *D. anomelani* Reddy and Krishnamurthy, were found in large numbers in all the localities visited. Six of the remaining seven species viz., *D. takahashii* Sturtevant, *D. eugracilis* Bock and Wheeler, *D. bipectinata* Duda, *D. mysorensis* Reddy and Krishnamurthy, *D. agumbensis* Prakash and Reddy, and *D. neonasuta* Sajjan and Krishnamurthy were found to be present in variable numbers in some localities and totally absent in others. *D. sahyadrii*, sp. nov., was collected from only two localities and that too from the flowers of *Ipomoea* species.

The quantitative and qualitative differentiation in the *Drosophila* fauna of different localities of the area under consideration is observed to be regulated by several environmental factors. The most important factor is the rainfall. As

Table 1. Distribution of different species of *Drosophila* in Sahyadri Hill range (Western Ghats)

Localities	1		2		3		4		5		Total
Altitude in meters	590		620		650		690		710		
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	
D. takahashii	..	..	5	4	4	3	6	5	..	..	27
D. eugracilis	1	3	6	8	9	13	..	..	12	10	62
D. sahyadrii, sp. nov.	5	1	..	..	..	..	..	..	3	..	9
D. malerkotliana	15	34	18	27	61	133	65	95	104	126	678
D. bipectinata	..	..	8	12	6	4	11	15	12	20	88
D. anomelani	9	2	10	14	13	11	5	14	18	13	109
D. mysorensis	..	..	2	4	..	1	9	12	5	7	40
D. agumbensis	10	15	..	..	3	9	..	2	7	11	57
D. nasuta	21	26	22	38	25	33	36	50	102	80	433
D. neonasuta	1	..	..	..	..	..	2	1	10	14	28
Total	62	81	71	107	121	207	134	194	273	281	1531
No. of species	7		7		8		8		9		



Figures 1 and 2. 1. Wing of male showing black patch. 2. Fore leg of male showing sex-combs.

ne moves from east to west along the banks of river Tunga, the increase in the verage rainfall brings about a gradual transition of the scrub type of vegetation o evergreen flora making the localities increasingly favourable for the colonization f *Drosophila*. The impact of rainfall and other concomitant changes in the ora on the *Drosophila* populations is clearly evidenced by the gradual increase n the number of individuals of different species in east-west direction. Further, nore than three-fourths of the population of *Drosophila* of this area is contri-uted by only three species namely *D. malerkotliana*, *D. nasuta* and *D. anomelani* ndicating perhaps the most favourable habitats for the colonization of these three pecies. The present study has also yielded a new species, *Drosophila sahyadrii*, vhich is herein described.

Drosophila sahyadrii, sp. nov.

Male and *Female* : Males dark brown (abdomen apically black); females light rown. Body length : males 2·2 mm; females 2·5 mm.

Head, ♂ and ♀ : Arista with 7 branches (4/3) including forked ones. Front rownish black in males, yellow in female. Antenna dark brown. Cheek with medium sized vibrissae along with a number of smaller ones. Palpi yellow. Carina narrow. Eyes red. Anterior orbitals same size as that of posterior, middle one half the size of them. Inner and outer verticals reclinate and are of he same size. Ocellar triangle small, light yellow with 2 ocellar bristles.

Wings : ♂ and ♀ : Female wings clear. Male wing (figure 1) with a black atch starting from the distal part of the marginal vein and extending partly into he submarginal cell but not touching the third longitudinal vein. Wing length: nale 1·9 mm; female 2·1 mm. Halteres small and yellowish.

Wing indices calculated as per the formulae of Okada (1956) :

	Costal index 2nd costal section/ 3rd costal section	4V index 4th section of IV vein/ 3rd section of IV vein	4C index 3rd costal section/ 3rd section of IV vein	5X index Last section of V vein/ posterior cross vein
Male	3·0	2·7	1·1	2·2
Female	2·6	3·0	1·4	2·2

Legs (figure 2) : Preapical bristles present on all tibiae; apicals on first and econd tibiae. Sex-comb of male in transverse rows on the first 3 tarsal segments; netatarsal portion consisting of 5 closely arranged rows of (from above down) , 6, 5, 4 and 4 teeth, the second tarsal segment having 2 rows of 3 and 4 teeth, nd the third tarsal segment with single tooth.

Abdomen, ♂ and ♀ : Tergites of female yellowish with thin apical bands. ternites of male black, faint anteriorly, dark posteriorly.

Periphallic organs (figure 3) : Epandrium (genital arch) laterally broad and orsally with slight mid-dorsal constriction. Toe with about 10 bristles. Lower

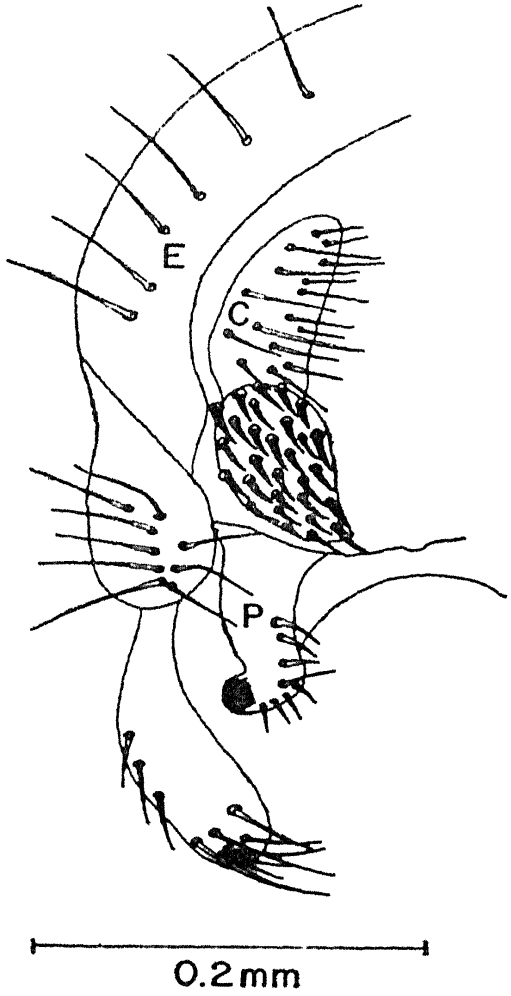


Figure 3. Periphallic organs : C= corci; E = epandrium; P= primary surstylus.

portion of genital arch (above the toe) with large bristles. Primary surstylus (primary clasper) only present, with a ventrolateral comb of 7–8 black teeth. Cerci (anal plate) with long fine bristles above and with a cluster of about 20 thicker bristles (teeth like) ventrally.

Phallic organs (figure 4) : Aedeagus brown, bare and apically rounded. Basal apodeme long. Anterior gonopophyses (anterior parameres) very long, heavily sclerotized, curved towards and articulated with aedeagus, dorsally black at tip, ventral lobe with 2–3 hairy sensilla. Posterior gonopophyses (posterior parameres) large and highly ornamented. Caudal margin of novasternum convex, with a pair of submedian spines.

Egg guide : Brown with about 13 teeth and a subterminal hair.

Internal structures : Testes orange, with 2 outer and 2 inner coils. Accessory glands small and slender. Ejaculatory bulb globular. Spermathecae small, sclerotized. Paraovaria minute. Ventral receptacle long, tightly coiled. Malpighian tubules 2 pairs and free.

Egg : 2 small filaments.

Pupae : Anterior spiracles with about 8–9 branches.

Holotype ♂ and allotype ♀ are deposited in the department. Two paratype males and females are placed in Tokyo Metropolitan University, Setagaya-ku, Tokyo, Japan, and ZSI, Calcutta.

Distribution : India : Karnataka.

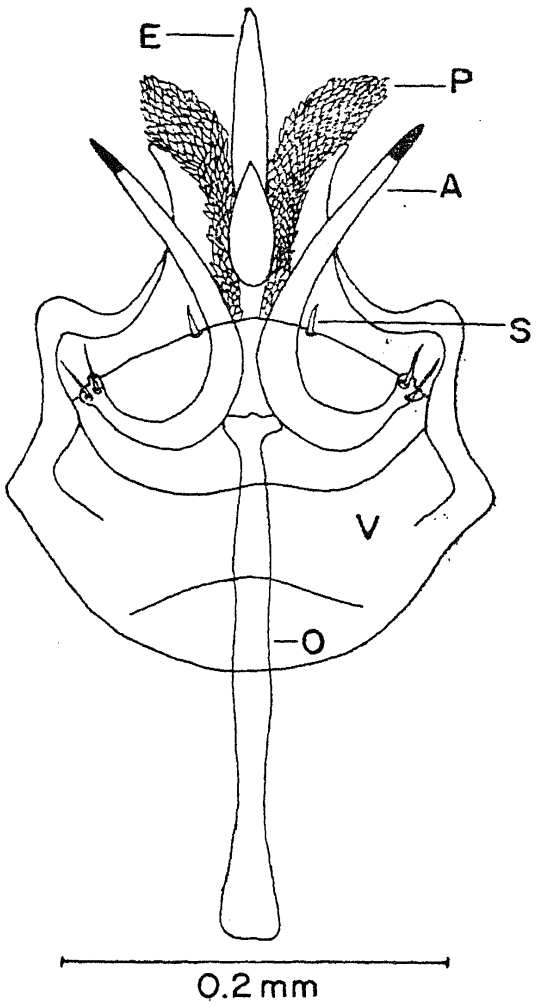


Figure 4. Phallic organs: A = anterior gonopophyses; E = aedeagus; O = ejaculatory apodeme; P = posterior gonopophyses; S = submedian spine of novasternum; V = ventral fragma.

4. Taxonomic status

The presence of 2 egg filaments, nature of puparia and the banding pattern of abdominal tergites warrant its inclusion in the subgenus *Sophophora.* The characters like the presence of sex-comb; periphallic organs with well developed epandrium, surstylus with teeth (setigerous clasper) ; phallic organs with anterior and posterior gonopophyses; long coiled ventral receptacle, and coiled testes justify its inclusion in the *melanogaster* species group (Bock and Wheeler 1972). Further, the presence of an apical black patch on the male wing; the pattern of sex-combs; presence of only primary surstylus with a ventrolateral comb of stout black teeth; long, slender, apically bare and nonbifid aedeagus, and large elongate apically black and pointed anterior gonopophyses permits its inclusion in the *suzukii* subgroup (Bock and Wheeler 1972).

5. Relationships

Okada (personal communication 1977) has pointed out that *D. sahyadrii* is a new species belonging to *suzukii* subgroup. On comparison with eight known

species of this subgroup it is found that the new species resembles *D. suzukii* Matsumura, *D. pulchrella* Tan, Hsu and Sheng, and *D. rajasekari* Reddy and Krishnamurthy in the possession of an apical wing patch in male, but it differs from them in other morphological characters such as sex-combs, periphallic and phallic organs. However, the new species distinctly differ from *D. unipectinata* Duda, *D. immacularis* Okada and *D. mimetica* Bock and Wheeler in the possession of apical wing patch and sex-combs pattern in male. It also differs from *D. lucipennis* Lin and *D. tristipennis* Duda in having sex-combs in males. The combination of characters such as sex-comb pattern, apical wing patch, nature of periphallic and phallic organs are unique to this species and are not found together in any of the known species of *suzukii* subgroup. Therefore, it deserves the status of a new species.

6. Remarks

The new species could not be attracted by the usual banana trap method. Only 9 individuals (8 males and 1 female) were obtained from the flowers of *Ipomoea* species. The single female caught in the wild could breed for only one generation in the laboratory. The progenies obtained were very few and the same have been used for analysis of wing indices and other internal characters.

The specific name of *Drosophila sahyadrii* is coined to denote the place, Sahyadri Hills, where it was collected for the first time.

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